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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/805,620	03/13/2001	Craig M. Carpenter	MI22-1563	3004

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WELLS ST. JOHN P.S.  
601 W. FIRST AVENUE, SUITE 1300  
SPOKANE, WA 99201

EXAMINER	
STOUFFER, KELLY M	

ART UNIT	PAPER NUMBER
1762	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/13/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

## Office Action Summary

Application No.

09/805,620

Applicant(s)

CARPENTER ET AL.

Examiner

Kelly Stouffer

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 20 February 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 27-35, 38, 40, 43 and 45-49 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 27-35, 38, 40, 43 and 45-49 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 2/20/07.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 20 February 2007 has been entered.

### ***Response to Arguments***

2. The examiner acknowledges the cancellation of claims 22-26 in the response filed 20 February 2007.

3. Applicant's arguments filed 20 February 2007 have been fully considered but they are not persuasive. The applicant argues that DiMeo in view of Ohashi and in further view of Sneh does not teach ceasing the precursor injection, substituting the precursor injection for additional purge material injection, and adjusting the first flow rate to a second flow rate different from the first as required in claim 27. However, DiMeo teaches an ALD process that uses purge gases in between precursor steps as in, for example, Figure 2. Ohashi modifies first and second flow rates of the other purge gas

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in Figures 1a-1d. Therefore, these references read on the limitations of claim 27 and the rejection of claims 27-35 is maintained and repeated here.

Further, the applicant argues that the claimed references disclose delivering purge material through the process chemical port while separately delivering purge material through the purge port in the manner claimed in claim 38. DiMeo discloses delivering purge material through the chemical port (shown in Figure 1 and described in column 9 lines 20-52). Ohashi describes flowing a purge curtain through a purge port in the manner claimed as was described in the previous office action. Therefore, these references read on the limitations of claim 38 and the rejection of claim 38 is maintained and repeated here

Similarly, the applicant alleges that the references do not teach delivering purge material through the chemical port, or forming a purge curtain during delivering purge material through the chemical port as required by claim 43. As was discussed above, DiMeo in combination with Ohashi reads on these limitations. Therefore the rejection of claims 43, and 45-47 is maintained and repeated here

The applicant additionally argues that the references do not teach the limitations of amended claim 40, namely using the purge curtain to prevent the precursor from migrating into the dead space. But Ohashi teaches a purge curtain flowing along chamber walls to prevent the precursor from migrating to the chamber walls and building up on their surface (column 2 lines 25-43). Any dead space that was near the chamber walls is therefore not contaminated by the precursor due to the purge curtain in Ohashi. Therefore, these limitations are met by the cited art.

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New grounds of rejection are below for amended claim 40 and added claims 48 and 49.

***Claim Rejections - 35 USC § 112***

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 40 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 40 recites the limitation "the purge curtain". There is insufficient antecedent basis for this limitation in the claim, as it was amended to depend upon claim 27.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

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1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

5. Claims 27-35, 38, 40, 43 and 45-49 are rejected under 35 U.S.C. 103(a) as being unpatentable over DiMeo, Jr. et al. (US' 6,972,430) in view of Ohashi et al. (US 6,059,885), in further view of Yamamuka et al. (US 6,312,526).

DiMeo teaches an ALD process that uses purge to eliminate process gases from the chamber between steps (column 5, lines 1-25). The reference is silent to using a purge curtain.

However, Ohashi teaches an annular, concentric purge curtain being fed into the chamber, around the periphery of the substrate and along the chamber walls, while the process gas is being injected over the substrate (column 18, lines 28-67). The curtain extends downward from above the substrate holder (figures 7 and 8). Figure 7 shows

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the purge curtain flowing past the substrate holder. The solid walls that make up the hollow annular portions (21, 829) of figures 6 and 8 read on being a flow diverter (column 17, lines 10-19). These walls partially extend into the chamber from the top (first wall, lid) of the chamber. In figure 10, the direction of the apertures (1048) read on not directing the purge gas towards the substrate and minimizing back flow. The aspects of the lid are read on in the figures. The process prevents particles from adhering to the walls of the chamber by eliminating dead spaces by filling them with a purge curtain (column 2, lines 25-43). As the purge enters the section labeled "I" in figure 6, it goes through an inlet port and then exits this section through an exit port into the chamber.

It would have been obvious at the time the invention was made to a person having ordinary skill in the art to use a purge curtain, as taught by Ohashi, in the process taught by DiMeo. By doing so, particles are prevented from adhering to the walls of the chamber.

The combination of references above fails to teach the flow diverter extending below the substrate holder. However, Yamamuka teaches such a configuration in figures 11 and 12. By doing so, the chances of particles adhering to the walls are even further reduced as the temperature distribution is made smaller and the process gas is not likely to flow against the flow of the purge gas (column 10, lines 10-58). It would have been obvious at the time the invention was made to a person having ordinary skill in the art to extend the flow diverter to below the substrate. By doing so, one would

reap the benefits of further reducing the chances of particles adhering to the walls of the chamber.

As to claim 27, Figures 1a-1d and figure 4 of Ohashi, teach the flow profiles that should be used when only one gas is being supplied to the chamber.

As to claim 38, Ohashi teaches that the purge curtain prevents adhering of particles to the wall. One of skill would recognize that it would also remove particles that are all ready adhered to the wall. To minimize the amount of purge gas would have been obvious at the time the invention was made to a person having ordinary skill in the art. By doing so, less purge gas is required. To determine the amount of purge gas in the curtain for the purge and deposition steps, if any at all, would have been within the skill of one practicing in the art, through routine experimentation.

All other limitations may be found in column 18, lines 28-67, and figures 7 and 8 of Ohashi.

As to claim 40, Ohashi teaches a purge curtain flowing along chamber walls to prevent the precursor from migrating to the chamber walls and building up on their surface (column 2 lines 25-43). Any dead space that was near the chamber walls is therefore not contaminated by the precursor due to the purge curtain in Ohashi.

As to claim 48, the purge material is injected through a passageway as claimed in Ohashi Figures 2 and 3 (also column 6 lines 1-29), and DiMeo Figure 1 (the showerhead, reference numbers 12,14).

As to claim 49, the relative gas flow rates are described in Ohashi column 13 lines 35-65. The relative flow rates depend the diameter of the gas holes and the way



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they are arranged. The flow rates are adjusted to receive a desired flow pattern and to prevent disturbance of film formation. The relative gas flow rates are therefore result-effective. It would have been obvious to one of ordinary skill in the art at the time of the invention to modify the gas flow rates in the claimed ranges by routine experimentation absent evidence showing criticality for the claimed ranges.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kelly Stouffer whose telephone number is (571) 272-2668. The examiner can normally be reached on Monday - Thursday 7:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Timothy Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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Kelly Stouffer  
Examiner  
Art Unit 1762

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TIMOTHY MEEKS  
SUPERVISORY PATENT EXAMINER